

WHAT IS CLAIMED IS:

1                   1.       A method for contracting collagen tissue at a target site on or  
2       within a patient's body comprising:  
3                   heating an electrically conducting fluid in the region of the target site; and  
4                   directing the heated electrically conducting fluid onto tissue at the target  
5       site to induce contraction of collagen fibers in said tissue.

1                   2.       The method of claim 1 wherein the electrically conducting fluid is  
2       heated to a temperature sufficient to substantially irreversibly contract the collagen fibers.

1                   3.       The method of claim 1 wherein the collagen fibers are heated to a  
2       temperature in the range of about 45°C to 90°C.

1                   4.       The method of claim 1 wherein the collagen fibers are heated to a  
2       temperature in the range of about 60°C to about 70°C.

1                   5.       The method of claim 1 wherein the heating step comprises applying  
2       high frequency voltage to an electrode terminal in contact with the electrically conducting  
3       fluid.

1                   6.       The method of claim 5 wherein the heating step further comprises  
2       inhibiting electric current from contacting the tissue at the target site to minimize damage  
3       to, or removal of, said tissue.

1                   7.       The method of claim 1 further comprising contacting the  
2       electrically conducting fluid with a return electrode to provide a current flow path from  
3       the electrode terminal, through the electrically conducting fluid, and to the return  
4       electrode.

1                   8.       The method of claim 7 further comprising maintaining a space  
2       between the electrode terminal and the tissue to inhibit electric current from directly  
3       contacting said tissue.

1                   9.     The method of claim 8 wherein the space between the electrode  
2     terminal and the tissue is between about 5 to 30 mm.

1                   10.    The method of claim 7 wherein the return electrode is positioned  
2     proximal to the electrode terminal to induce current flow from the electrode terminal  
3     away from the target site.

1                   11.    The method of claim 1 further comprising directing the electrically  
2     conducting fluid along a fluid path past the electrode terminal and to the target site.

1                   12.    The method of 7 further comprising directing the electrically  
2     conducting fluid past the return electrode to generate the current flow path between the  
3     return electrode and the electrode terminal.

1                   13.    The method of claim 7 further comprising supplying the electrically  
2     conductive fluid to a proximal end of an axial lumen defined by the return electrode and  
3     directing the fluid through a distal end of the axial lumen to the electrode terminal.

1                   14.    The method of claim 5 further comprising immersing the target site  
2     within a supply of the electrically conductive fluid and heating the electrically conducting  
3     fluid in the region of the electrode terminal sufficiently to propel the heated electrically  
4     conducting fluid away from the electrode terminal to the target tissue.

1                   15.    The method of claim 14 further comprising positioning a return  
2     electrode within the supply of electrically conductive fluid to generate the current flow  
3     path between the target site and the return electrode.

1                   16.    The method of claim 1 wherein the electrode terminal comprises an  
2     electrode array including a plurality of electrically isolated electrode terminals.

1                   17.    The method of claim 1 further comprising:

2 supporting the electrode terminal with an electrosurgical probe having a  
3 tissue treatment surface near a distal end of the probe, wherein the electrode terminal is  
4 substantially flush with the tissue treatment surface.

1 18. The method of claim 1 further comprising applying RF frequency  
2 voltage to a plurality of electrically isolated electrode terminals within the electrically  
3 conducting fluid.

1 19. The method of claim 18 further comprising independently  
2 controlling current flow from at least two of the electrode terminals based on impedance  
3 between the electrode terminal and a return electrode.

1 20. The method of claim 1 wherein the electrically conductive fluid  
2 comprises isotonic saline.

1 21. The method of claim 1 further comprising applying RF frequency  
2 voltage to at least one electrode terminal within the electrically conducting fluid, the  
3 voltage being in the range of about 20-90 volts rms.

1 22. A method for contracting collagen tissue at a target site on or within a  
2 patient's body comprising:

3 positioning a tissue treatment surface of an electrode terminal in close  
4 proximity to the target site in the presence of an electrically conducting fluid;

5 contacting the electrically conducting fluid with a contact surface of a  
6 return electrode to generate a current flow path between the electrode terminal and the  
7 return electrode; and

8 applying high frequency voltage to the electrode terminal and the return  
9 electrode, the voltage being sufficient to induce a contraction of collagen fibers at the  
10 target site without causing dissociation or molecular breakdown of the collagen fibers.

1 23. The method of claim 22 further comprising controlling a depth of  
2 tissue penetration of the electric current into the tissue to control a depth of thermal  
3 heating of said tissue.

1                   24.     The method of claim 23 wherein the controlling step is carried out  
2     by controlling a frequency of the voltage applied to the electrode terminal and the return  
3     electrode.

1                   25.     The method of claim 23 wherein the controlling step is carried out  
2     by controlling a diameter of the electrode terminal.

1                   26.     The method of claim 23 wherein the electrode terminal is supported  
2     at a distal end of an electrosurgical probe and the controlling step is carried out by  
3     controlling a distance between an outer perimeter of the probe and the electrode terminal.

1                   27.     The method of claim 24 wherein the voltage has a frequency of less  
2     than 350 kHz.

1                   28.     The method of claim 24 wherein the voltage has a frequency of  
2     about 100 to 200 kHz.

1                   29.     The method of claim 23 wherein the depth of tissue heating is less  
2     than about 3.5 mm.

1                   30.     The method of claim 23 wherein the depth of tissue heating is less  
2     than about 0.5 mm.

1                   31.     The method of claim 23 wherein the controlling step further  
2     comprises positioning the return electrode such that electric current flows from the  
3     electrode terminal away from the target site to the return electrode.

1                   32.     The method of claim 22 further comprising heating the electrically  
2     conductive fluid adjacent the electrode terminal with the high frequency voltage and  
3     propelling the heated fluid to the tissue at the target site to apply thermal energy to the  
4     tissue.

1           33. The method of claim 24 wherein the thermal energy is sufficient to  
2 induce contraction of the collagen fibers at the target site and low enough to minimize  
3 molecular dissociation or breakdown of the tissue.

1           34. The method of claim 22 wherein the voltage difference applied  
2 between the return electrode and the electrode terminal is about 30 to 70 volts rms.

1           35. A surgical instrument for applying high frequency electrical energy  
2 to tissue at a target site comprising:

3           a shaft having a proximal end and a distal end;

4           an electrically insulating support at or near the distal end of the shaft, the  
5 electrically insulating support having a tissue treatment surface;

6           an electrode array comprising at least three electrode terminals at least  
7 partially embedded within the electrically insulating support, wherein the electrode  
8 terminals are substantially flush with the tissue treatment surface of the electrically  
9 insulating support; and

10          one or more connectors extending from the electrode terminals to the  
11 proximal end of the shaft.

1           36. The surgical instrument of claim 34 further comprising a return  
2 electrode positioned on the shaft proximal to the electrode array.

1           37. The surgical instrument of claim 35 wherein the electrode terminals  
2 are electrically isolated from each other.

1           38. The surgical instrument of claim 35 further comprising at least five  
2 electrode terminals embedded within the electrically insulating support.

1           39. The surgical instrument of claim 35 wherein the electrically  
2 insulating support comprises an inorganic material selected from the group consisting  
3 essentially of glass, ceramic and glass/ceramics.

1           40.    The surgical instrument of claim 35 wherein the return electrode is  
2   a substantially annular band positioned proximal to the electrode array.

1           41.    The surgical instrument of claim 35 wherein the electrode terminals  
2   each have a tissue treatment surface substantially flush with the tissue treatment of the  
3   electrically insulating support so as to minimize dissociation and breakdown of collagen  
4   fibers in the tissue and to minimize ablation of tissue surrounding the collagen fibers

1           42.    The surgical instrument of claim 41 wherein the tissue treatment  
2   surfaces of the electrode terminals each have a surface area less than about 1 mm<sup>2</sup>.

1           43.    The surgical instrument of claim 41 wherein a distal portion of the  
2   shaft is bent such that the electrode terminals have a tissue treatment surface that is non-  
3   perpendicular to the longitudinal axis of the shaft.

1           44.    A system for applying high frequency electrical energy to a tissue  
2   at a target site comprising:

3                   an electrosurgical probe having a shaft with proximal and  
4   distal ends and at least one electrode terminal at or near the distal end;

5                   a fluid delivery element for delivering electrically  
6   conductive fluid to the target site;

7                   a return electrode spaced from the electrode terminal; and

8                   an electrosurgical power supply for applying high  
9   frequency voltage to the electrode terminal and the return electrode, the voltage being  
10   sufficient to induce contraction of collagen fibers within the tissue.

1           45.    The system of claim 44 wherein the return electrode is positioned  
2   to draw electric current from the electrode terminal away from the tissue at the target  
3   site.

1           46.    The system of claim 44 wherein the return electrode is positioned  
2   on the shaft of the probe proximal to the electrode terminal

1           47.    The system of claim 44 wherein the voltage is selected to heat the  
2   electrically conductive fluid to a temperature sufficient to cause contraction of the  
3   collagen fibers within the tissue.

1           48.    The system of claim 44 wherein the voltage is selected to heat the  
2   collagen fibers to a temperature of about 60°C to 70°C.

1           49.    The system of claim 44 wherein the power supply comprises means  
2   for controlling a depth of penetration of electric current into human tissue.

1           50.    The system of claim 44 wherein the power supply has an operating  
2   frequency less than 350kHz.

1           51.    The system of claim 44 wherein the power supply has an operating  
2   frequency between about 100 to 200 kHz.

1           52.    The system of claim 44 further comprising an array of electrode  
2   terminals positioned at a distal end of the electrosurgical probe, the terminals each having  
3   a diameter of less than 1 mm to about 0.05 mm.

1           53.    The system of claim 44 further comprising an array of electrode  
2   terminals positioned at a distal end of the electrosurgical probe, the terminals being  
3   spaced at least a distance of about 0.2 mm to about 0.75 mm.